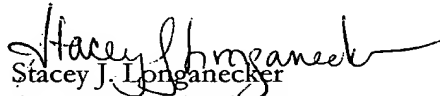


REMARKS

By the present Amendment, the specification has been amended to provide continuing application information, as indicated on the declaration filed concurrently herewith, and to delete text. A copy of pages 1 and 12 of the originally-filed application are attached indicating the amendments proposed herein in handwriting. No new matter is being introduced into the application by virtue of the proposed Amendment.

Respectfully Submitted,


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Patent Application

For

METHOD AND APPARATUS FOR CONCATENATED CONVOLUTIONAL
ENCODING AND INTERLEAVING

By

Paul D. Marko

[0001] This application is a continuation^{in-part} of U.S. Patent Application Serial No. 09/433,861, filed November 4, 1999, and a continuation-in-part of U.S. Patent Application Serial No. 09/318,938, filed May 26, 1999, now issued as U.S. Patent No. 6,154,452.

U.S. Patent Application Serial No. 09/688,824, filed October 17, 2000, which is a continuation of

Field of the Invention:

[0002] The invention relates to a method and apparatus for concatenated convolutional encoding and interleaving of a source data stream for transmission.

Background of the Invention:

[0003] Radio frequency transmissions are often subjected to multipath fading. Signal blockages at receivers can occur due to physical obstructions between a transmitter and the receiver or service outages. For example, mobile receivers encounter physical obstructions when they pass through tunnels or travel near buildings or trees that impede line of sight (LOS) signal reception. Service outages can occur, on the other hand, when noise or cancellations of multipath signal reflections are sufficiently high with respect to the desired signal.

[0004] Communication systems can incorporate two or more transmission channels for transmitting the same program or data to mitigate the undesirable effects of fading or multipath. For example, a time diversity communication system delays the transmission

single bit stream. For example, the system 110 can be configured to place all interleaved bits from a source stream on one TDM stream, as opposed to sending one-half of the source stream bits on one transmission channel and the other half of the source stream bits on another transmission channel. The TDM stream can then be sent via satellite, or via a terrestrial transmitter. The terrestrial transmitted is not necessarily a terrestrial repeater 118 since the source stream can originate from the terrestrial transmitter, as opposed to being received via satellite and subjected to baseband processing and frequency translation.

[0050] One of the advantages of the present invention is improved error concealment at the receivers during times of broadcast signal blockage. A signal blockage of five consecutive frames, for example, in a time diversity system can cause an audio mute interval. By contrast, the same blockage in a system implementing the present invention allows the source bit stream to be recovered using audio error concealment algorithms. With reference to Fig. 9, for example, the first satellite channel can be blocked altogether (e.g., obstructed by terrain), and the second satellite channel can be momentarily blocked for a certain number of frames. Following reception and reordering of the second satellite channel, the recovered data stream can contain merely single frame outages, as opposed to the outage of many frames. The single frame outages are short enough to apply audio error concealment algorithms. The operation of the audio error concealment algorithms can be further enhanced by reducing the frame length and thereby reducing the concealment intervals. Alternatively, audio signals in the source bit stream can be split into two half-bit rate data streams. For example, the odd and even frames can carry respective ones of the two half-bit rate audio streams. Thus, if a frame can carry a 64 kilobit per second (kbps) audio channel, and satellite signal blockage occurs, then at least 32 kbps or half-bit rate audio is available during the service outage.

[0051] Although the present invention has been described with reference to a preferred embodiment thereof, it will be understood that the invention is not limited to the details thereof. Various modifications and substitutions have been suggested in the foregoing description, and others will occur to those of ordinary skill in the art. All such substitutions are intended to be embraced within the scope of the invention as defined in the appended claims.